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## Remarks

Claims 1-19 are pending in the application. Claims 1, 7, 11, 12, 16, 18 and 19 have been amended and claim 10 has been canceled herein. Favorable reconsideration of the application, as amended, is respectfully requested.

### I.     REJECTION OF CLAIMS 1-19 UNDER 35 USC §112

#### a.     Rejection of Claims 10-12 under 35 USC §112, first paragraph
Claims 10-12 stand rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement. Withdrawal of the rejection is respectfully requested for at least the following reasons.

The Examiner contends that claims 10-12 recite method steps that decide a problem known as the Halting Problem, which is proven unsolvable. Applicants respectfully disagree with the Examiner.

Initially, it is noted that claim 10 has been canceled and claims 11-12 have been amended in a way to remove any issue with respect to the alleged Halting Problem. Accordingly, the rejection of claims 10-12 is moot. However, claim 1 has been amended to include the features of claim 10 and, therefore, the rejection will be discussed with respect to amended claim 1.

Amended claim 1 recites the step of *analyzing the loop termination condition to determine whether it is **possibly** non-terminating*. Claim 1 does not recite that the loop is analyzed for __definite__ non-termination. Certainly, it is __possible__ to analyze a loop termination condition to determine if it __may__ be non-terminating.

"Possibly non-terminating", as recited in claim 1, is substantially different from definitely non-terminating, as would be required to solve the "Halting Problem". Thus, claim 1 does not recite steps that decide a problem known as the Halting Problem.

While the Examiner refers to page 50, lines 13-14 as describing a method that would include solving the Halting Problem, this is irrelevant in the present instance. As noted above, claim 1 uses the word "possibly". Whether or not the specification discloses a method that could be interpreted as solving the halting problem is not at

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issue. The issue is what is actually claimed. With respect to claim 1, it does not recite a method that could include solving the halting problem.

Accordingly, claim 1 is enabled and therefore satisfies the requirements of 35 USC §112, first paragraph.

### b.    Rejection of claims 1-19 under 35 USC §112, second paragraph

Claims 1-19 stand rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claims the subject matter which applicant regards as the invention.

### 1.    Claim 1

The Examiner contends that it is not clear whether the *at least one first language* of step (b) corresponds to the *at least one first programming language* of the preamble.

Claim 1 has been amended to remove any issue as to the alleged indefiniteness and, therefore, the rejection is moot.

The Examiner also contends that it is unclear what is meant by "applying to the simulation engine". More specifically, the Examiner states it is unclear whether this should be interpreted as a step of initializing the simulation engine or a step of performing simulation.

Applicants' believe the language is sufficiently clear in light of the specification. For example, Figs. 9 and 10 illustrate several models being applied to the simulation engine, which then produces a simulation result. The step of "applying" refers to the respective models being provided to the simulation engine to perform the simulation.

Accordingly, withdrawal of the rejection of claim 1 is respectfully requested.

### 2.    Claims 10-12

The Examiner contends that the limitation of determining whether a loop condition is possibly non-terminating has several interpretations. According to the Examiner, the first meaning is that the loop is executed at least once, and the second is that the loop may or may not terminate depending on the processing of data values that can only be determined by simulating the loop (which pertains to the "Halting Problem" discussed above). A third meaning is that in a "for" loop the loop variable is manipulated within the body of the loop.

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As was noted above, claim 10 has been canceled and claims 11-12 have been amended in a way to remove any issue with respect to the alleged indefiniteness. Accordingly, the rejection of claims 10-12 is moot. However, claim 1 has been amended to include the features of claim 10 and, therefore, the rejection will be discussed with respect to amended claim 1.

Applicants respectfully submit that the language used in amended claim 1 is sufficiently clear. The claims recite that a loop is analyzed for <u>possible</u> non-termination. It is irrelevant how the loop may terminate, or that based on some unknown condition one cannot correctly or certainly ascertain if the loop actually will terminate.

Accordingly, it is respectfully submitted that amended claim 1 satisfies the requirements of 35 USC §112, second paragraph.

### 3.    *Claims 16, 18 and 19*
The Examiner rejects claim 16 for insufficient antecedent basis for "an apparatus" and that apparatus claim 16 should not depend from method claim 1. Similarly, claim 18 is rejected for insufficient antecedent basis for "a computer program", and that claim 18 should be an independent claim or depend from claim 17. Finally, claim 19 also is rejected for insufficient antecedent basis for "a storage medium containing a program", and that claim 19 should be an independent claim or depend from claim 16.

Initially, applicants respectfully submit that there is proper antecedent basis for each of the limitations recited by the Examiner.

With respect to the dependencies of the respective claims, claims 16, 18 and 19 have been amended to remove any issue with respect to dependency and, therefore, the rejection is moot.

Accordingly, withdrawal of the rejection of claims 16, 18 and 19 is respectfully requested.

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## II. REJECTION OF CLAIMS UNDER 35 USC §101

Claims 1-19 stand rejected under 35 USC §101 because the claimed invention is directed to non-statutory matter. Withdrawal of the rejection is respectfully requested for at least the following reasons.

### a. Claim 1

The Examiner contends that "co-simulating" does not produce a useful, concrete and tangible result. Although not clear, it appears the Examiner contends that claim 1 does not recite a "result" (e.g., simulation output on a display), and therefore does not meet the requirements of §101.

Further, the Examiner cites to MPEP §2106 II in making the rejection. However, it appears that the Examiner has misinterpreted this section of the MPEP. MPEP §2106 II(A) states that

> usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. Merely claiming nonfunctional descriptive material stored in a computer-readable medium does not make the invention eligible for patenting. For example, a claim directed to a word processing file stored on a disk may satisfy the utility requirement of 35 U.S.C. 101 since the information stored may have some "real world" value. However, the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole must produce a "useful, concrete and tangible" result to have a practical application

MPEP §2106 II(A) does not require that the claim explicitly recite a "result". Instead, the claimed invention as a whole must provide a useful, concrete and tangible result. Claim 1 of the present application satisfies the requirements of §101.

For example, the method of claim 1 provides a co-simulation method, and recites specific steps for the co-simulation method. The result of the method provides faster co-simulation than prior art methods of co-simulation (see, e.g., page 15 of the specification). Further, claim 1 recites features that make the above results possible, and such features are not "nonfunctional descriptive material", as discussed in §101. Additionally, co-simulation itself is advantageous in that it enables one to verify a design prior to actual hardware implementation of the design, thereby saving fabrication time and expense.

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Clearly, the invention of claim 1 provides a useful result and, therefore, meets the requirements of 35 USC §101.

Accordingly, withdrawal of the rejection of claim 1 is respectfully requested.

### b.      Claims 18 and 19

The Examiner rejects claims 18 and 19 for being drawn to a computer program *per se* and not being drawn to the technical arts, respectively, and therefore are directed to non-statutory subject matter.

By way of the foregoing amendments, claims 18 and 19 have been amended to place them in a proper form and, therefore, the rejection is moot.

Accordingly, withdrawal of the rejection of claims 18 and 19 is respectfully requested.

### III.      REJECTION OF CLAIMS 1-7, 13-14 AND 16-19 UNDER 35 USC §102

Claims 1-7, 13-14 and 16-19 stand rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,870,588 to *Rompaey et al.* (hereinafter *Rompaey*). Withdrawal of the rejection is respectfully requested for at least the following reasons.

Claim 1 has been amended to include the subject matter of claim 10 and now recites a method of co-simulating a digital circuit that includes converting the at least one first model to at least one software model in the at least one first programming language, wherein converting includes generating, for at least one discrete process, software code including a program loop having a jump instruction and a loop termination condition, and analyzing the loop termination condition to determine whether it is possibly non-terminating and, if so, replacing the jump instruction with an exit point.

The Examiner, in rejecting original claim 10 under §103(a), without rejecting claim 10 under §102, effectively admits that *Rompaey* does not teach or suggest this feature. Moreover, *Rompaey* has not been found to teach or suggest these above features. Since these feature are now included in amended claim 1, *Rompaey* does not anticipate amended claim 1 for at least the same reasons that it does not anticipate original claim 10.

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Accordingly, withdrawal of the rejection of claim 1 is respectfully requested.

Claims 2-7, 13, 14 and 16-19 depend from claim 1 and, therefore, can be distinguished from *Rompaey* for at least the same reasons.

Accordingly, withdrawal of the rejection of claims 2-7, 13, 14 and 16-19 is respectfully requested.

## IV.    REJECTION OF CLAIMS 8-12 AND 15 UNDER 35 USC §103

Claims 8-12 and 15 stand rejected under 35 USC §103(a) as being unpatentable over *Rompaey*. Withdrawal of the rejection is respectfully requested for at least the following reasons.

As was noted above, claim 1 has been amended to include the features of original claim 10, and claim 10 has been canceled. Accordingly the rejection of claim 10 is moot. However, since the features of claim 10 are included in claim 1, the rejection will be discussed with respect to amended claim 1.

In rejecting original claim 10, the Examiner contends that the features therein pertained to preemptive scheduling, and the Examiner took Official Notice that preemptive scheduling is well known in the art.

The features of amended claim 1 do not pertain to preemptive scheduling. In fact, the features of amended claim 1 do not recite any scheduling at all. Instead, the invention of amended claim 1 monitors a loop to determine if it is possibly non-terminating. This results in a more efficient simulation. For example, if a loop is guaranteed to terminate then it can be allowed to run to completion without adding scheduling switches, since it is known that other processes will eventually will be allocated a chance to run. If a loop might not terminate, then a scheduler would be executed at finite intervals to prevent other processes from becoming locked. If preemptive scheduling were implemented, these steps would not be required, but the system would be slower.

In other words, the invention of amended claim 1 enables the system to execute without preemptive scheduling. Thus, the Examiner has misinterpreted the features of amended claim 1. Therefore, amended claim 1 is not rendered obvious by *Rompaey*.

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Since claims 8, 9, 11, 12 and 15 depend from claim 1, they can be distinguished from *Rompaey* for at least the same reasons.

Accordingly, withdrawal of the rejection of claims 8, 9, 11, 12 and 15 is respectfully requested.

## V.     CONCLUSION

Accordingly, claims 1-9 and 11-19 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.
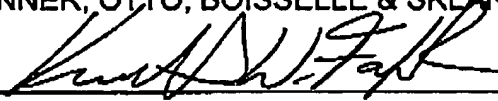
Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

In the event any fee or additional fee is due in connection with the filing of this paper, the Commissioner is authorized to charge those fees to our Deposit Account No. 18-0988 (under the above Docket Number).

Respectfully submitted,

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